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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
SODERQUIST, ARLEN	
ART UNIT	**PAPER NUMBER**
1743	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	02/05/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	09/544,344	SNOW ET AL.	
	Examiner	Art Unit	
	Arlen Soderquist	1743	

-- *The MAILING DATE of this communication appears on the cover sheet with the correspondence address* --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *18 July 2006*.

2a)☒ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,2,4,6-9,21,22,25-38,40-45 and 47-55* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2,4,6-9,21,22,25-27,29-34,37,38,40,41,43-45 and 47-55* is/are rejected.

7)☒ Claim(s) *28,35,36 and 42* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *06 April 2000* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

1. Applicant's request for reconsideration of the finality of the rejection of the last Office action is persuasive and, therefore, the finality of that action is withdrawn.

2. Since it is relevant to the interpretation of the claims, examiner is treating the ligand shell as found in the claims as follows. The ligand shell is composed of ligand shell molecules and additionally may contain molecules that are "coupling agent" as found in the instant specification on page 17, line 22 to page 18, line 20 which is reproduced below with added emphasis.

> "The **sensor surface and substrate are cleaned by a plasma or chemical treatment and coupling agents are applied. Coupling agents are difunctional molecules with an inert spacing structure separating the functional groups** (e.g. an a-ω silyl alkanethiol, such as $(CH_3O)_3Si(CH_2)_3SH$, or a dithiol, $HS(CH_2)_6SH$)). **One functional group bonds to the sensor/substrate** (e.g., the --$Si(OCH_3)_3$ or the --SH functional group) **surface**, and **the other** (e.g., a second --SH functional group) is oriented away from the surface **for subsequent bonding with the multiplicity of particles**. The ligand shell of the metal particle is a dynamic system where an individual molecule may be displaced by a similarly functionalized molecule. Thus, **the immobilized thiol group of the absorbed coupling agent may bond to a particle and immobilize it on the aforementioned surface**. In this fashion a monolayer of particles is chemisorbed on the surface. **Subsequently, the immobilized particle monolayer is exposed to a solution of a dithiol coupling agent. The dithiol exchanges with some of the monofunctional thiol ligand molecules in the immobilized particle ligand shell and positions the second thiol group on the outer surface of the immobilized particle's ligand shell. A second exposure to a solution for forming the stabilized multiplicity of particles results in chemisorption of a second particle layer on the first**. In this manner many layers of particles are built up into a multilayer film."

For this interpretation of a ligand shell, all that is required to meet the ligand shell language is some molecules that are not coupling agents in the encapsulating layer. As an example, figure 1 of the cited and below applied Vossmeyer reference shows a structure in which the encapsulating layer of the gold particles contains both coupling agents (a bifunctional molecule that couples two particles or a particle and a substrate together – HS----SH) and molecules that are not coupling agents (ligand shell molecules – H_2N----).

3. Claims 29-30 are objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. Claim 27 limits the film of a multiplicity of particles to a "three-dimensional close-packed orientation" or requires that presence of more than a monolayer of

particles. Thus these claims are outside of the scope of claim 27 since they only produce a single layer rather than multiple layers.

4. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

5. Claims 52 and 54 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for a device having the multiplicity of core/ligand shell particles in three-dimensional close-packed orientation made by the process of claim 28 when the ligand shell is composed of an encapsulating monomolecular layer of ligand shell molecules that are not coupling agents, does not reasonably provide enablement for a three dimensional structure made by a process other than the spraying process of claim 28. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the invention commensurate in scope with these claims. The above noted definition of a coupling agent appears to exclude the layer by layer method and the final three dimensional structures produced thereby. Page 17, lines 9-11 teach that a method of casting from solution followed by slow evaporation does not produce an acceptable film. See page 17, line 8 through page 19, line 2 of the instant specification for the only methods for forming final structure of the multiplicity of particles in three-dimensional close-packed orientation that are taught in the specification. Applicant and the art of record do not teach any other manner of making the particles in three-dimensional close-packed orientation. Thus, of the three methods taught in the instant specification, only the spraying method appears to be within the scope of the ligand shell being composed of an encapsulating monomolecular layer of ligand shell molecules that exclude coupling agents as in the instant claims. This is because the structure that is being claimed is the final 3-dimensional structure of the multiplicity of particles and the particles are substantially free of coupling agents.

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill

in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* v. *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

7. Claims 1-2, 4, 6-9, 21-22, 25-27, 29-34, 37-38, 40-41, 43-45, 47-51, 53 and 55 are rejected under 35 U.S.C. 103(a) as being unpatentable over Andres (*Science*, 1996) in view of Bethell (*J. Electroanal. Chem.* 1996), Vossmeyer (*Angewandte Chemie, International Edition in English* May 15,1997) and Hostetler (*Journal of the American Chemical Society*, 1996). In the paper Andres teaches self-assembly of a two-dimensional superlattice of molecularly linked metal clusters. Close-packed planar arrays of nanometer-diameter gold clusters that are covalently linked to each other by rigid, double-ended organic molecules were self-assembled into the superlattice. Au nanocrystals, each encapsulated by a monolayer of alkyl thiol molecules were cast from a colloidal solution onto a flat substrate to form a close-packed cluster monolayer. Organic interconnects (aryl dithiols or aryl diisonitriles) displaced alkyl thiol molecules and covalently linked adjacent clusters in the monolayer to form a two-dimensional superlattice of metal quantum dots coupled by uniform tunnel junctions. (Figure 3B shows the presence of some alkyl thiol surrounding the nanocrystals even after the nanoparticles are linked.) Electrical conductance through such a superlattice of 3.7-nm-diameter Au clusters, deposited on a SiO_2 substrate in the gap between two Au contacts and linked by an aryl di-isonitrile [1,4-di(4-isocyanophenylethynyl)-2-ethylbenene], exhibited nonlinear Coulomb charging behavior. Page 1692 in the two paragraphs that bridge the three columns teach a ligand shell thickness of ~1.2 nanometers for the dodecanethiol ligand shell along with the possibility that the molecules on adjacent clusters interpenetrate to give a cluster spacing that is less than the expected layer thickness. For the dithiol linked clusters the spacing is about 1.7 nm between clusters using a 2 nm length molecule as the linking molecule. In the last full paragraph of the center column of page 1691, Andres teaches that the synthetic method used produces particles

that are equivalent to those produced by the Brust method (see reference 5). The advantage of using the Andres method is flexibility in the formation of the particles (last paragraph of page 1693). By altering the size or composition of the clusters, the length and chemical structure of the molecules used as molecular interconnects and the character of the substrate, a wide range of electronic behavior can be achieved such as the coulomb charging behavior that was observed by Andres. Andres does not teach a multilayer network or other types of encapsulating molecules.

In the paper Bethell describes simple methods for the production of Au nanoparticles with narrow size distributions by reduction of tetrachloroaurate solutions in the presence of thiol-containing organic compounds which self-assemble on the Au surface. Stable solutions of somewhat larger particles can be produced if the thiol is absent. The thiol-derivatized materials are stable in air over long periods and can be handled in much the same way as simple organic compounds. Page 138, column 1, last full paragraph teaches derivatized particles having a core diameter of 1.5-3 nm with particles that are derivatized with nonanethiol having a mass suggesting a gold content of about 150 atoms. Subheading 2.1 contains a reference to an article by M. Brust that is also cited in the instant specification as one of the methods for making the metal core-ligand particles of the instant invention (***see page 13, line 23 to page 14, line 8***). In figure 1(b) a spectrum of dodecanethiol-derivatized particles is presented (***see examples 10-13, page 33 line 9 to page 34, line 10 for a description of particles made with dodecanethiol***). Table 1 teaches a range of dithiol containing molecules. Each of these is clearly within the thiol derivatives taught in the instant specification (***see page 12 line 21 to page 13 line 11 and 26-30 page 39, line 12 to page 41, line 23***). Using dithiols as the derivatizing spacer units, methods were developed for the preparation of materials in 3-dimensional form and as thin films attached to a solid substrate (figure 3, and the only full paragraph on page 139). (***A comparison of this procedure with that found in examples 26-30 shows that there is significant similarity and that the Bethell process forms a self-assembled layered structure as in the examples.***) Such materials show conductivities that mimic the behavior of semiconductors and that depend markedly on the structure of the dithiol used to link the Au particles together. Thus there is inherently a structure capable of being used to measure conductivity. The increase in conductivity with increasing temperature probably involves activated electron hopping from particle to particle. Surfaces treated with a coating of the materials show electroreflectance

changes with applied potential that also differ according to the structure of the dithiol spacer. Unusual effects were observed on heterogeneous electron transfer from electrode surfaces treated with layers of the Au nanoparticles and dithiol spacers. Applications for these nanostructured materials can be envisaged, which range from submicroelectronic devices and circuitry to electrical modification of the reflectance of glass. Such applications will require a multidisciplinary approach with a substantial organic chemical research input. Section 4 and figure 5 discuss other methods of making the clusters which use multi-functional groups on the ligand layer surrounding the metal core.

In the paper Vossmeyer teaches light-directed assembly of nanoparticles. Cleaned glass or silicon slides were treated with 3-aminopropyldimethylethoxysilane and the surface amino groups were reacted with nitroveratryloxycarbonylglycine (NVOC) to produce photosensitive surface. Imagewise irradiation with λ>340 nm through a microchip mask yielded a pattern of free- and protected amino groups. The patterned substrate was kept overnight in the solution containing 12-aminododecane-capped Au particles to bind Au nanocrystals to the surface-bound amino-groups. To amplify particle binding the surface-bound Au particles were treated with 1,8-octanedithiol to yield free, surface-bound thiol groups on the areas where Au particles were attached to the surface. Following the dithiol treatment the slides were dipped again in the gold solution to bind more Au nanocrystals on the previously bound particles. This dithiol amplification was repeated several times to enhance the micropattern contrast until it was readily visible with the naked eye or via optical microscope. Figure 1 of the reference shows a structure in which the encapsulating layer of the gold particles contains both coupling agents (a bifunctional molecule that couples two particles or a particle and a substrate together – HS----SH) and molecules that are not coupling agents (ligand shell molecules – H_2N----).

Hostetler discusses monolayers in three dimensions, the synthesis and electrochemistry of ω-functionalized alkanethiolate-stabilized gold cluster compounds. They report the synthesis and characterization of Au cluster compounds containing a mixture of alkanethiolate and ω-substituted alkanethiolate ligands. Cluster molecules prepared with alkanethiolate ligands, according to previous work, have a ~1.2 nm radius Au core that, modeled as a 309-Au atom cubooctahedron, bears a monolayer ligand skin of ~95 alkenethiolate chains. The ω-

functionalized clusters are synthesized by place exchange reactions in solution mixtures of alkanethiolate cluster molecules and ω-substituted alkanethiols, where the ω-substituent can be -Br, -CN, vinyl, or ferrocenyl. The second paragraph of page 4212 teaches that this is done in this manner because it preserves the gold core dimensions that occur with other functionalization schemes. Also taught in the paragraph is that functionalization of the clusters is a prerequisite for their use in various applications to include chemical sensors and to create two- and three-dimensional structures. Hostetler references two articles by Brust that are also referenced by Bethell. The reaction products, according to ^{1}H NMR spectroscopy, include cluster molecules with as many as 44 bromide and 15 ferrocenyl ω-substituents. Steric ω-substituent interactions appear to constrain the extent of place exchange. Ferrocenyl-substituted clusters are electroactive in methylene chloride solutions as adsorbed monolayers and as diffusing solutes. The mass transport behavior indicates that as many as 15 ferrocene units in a substituted cluster molecule can be oxidized at an electrode surface over a potential range as narrow as that required to oxidize a ferrocene monomer, i.e., the cluster has promise as a reagent that delivers multiple equivalents of redox activity at nearly identical formal potentials. The Au cores of the clusters also exhibit "double layer" charging behavior and are thus true molecular "nanoelectrodes".

It would have been obvious to one of ordinary skill in the art at the time the invention was made to produce a three dimensional structure as taught by Bethell or Vossmeyer using he coupling agents particles and coupling agents of Andres or the particles of Andres and the coupling agents of Bethell or Vossmeyer because of the ability to replace some of the ligand shell molecules with coupling agents as shown by Andres and Vossmeyer and the desire to create new materials for possible use in electronic structures as taught by Andres and Bethell. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use ligand shell molecules having thiol functional groups as taught by Hostetler or amino groups as taught by Vossmeyer in the encapsulating shell of the Andres particles because of the ability to preserve the metal core diameter as taught by Hostetler compared to other linking methods and the ability to functionalize or modify the electronic behavior of the assembly (material) for different applications such as a chemical sensor as taught by Andres and Hostetler.

8. Claims 27, 29-32, 43-45, 48 and 55 are rejected under 35 U.S.C. 103(a) as being unpatentable over Andres in view of Bethell, Vossmeyer and Hostetler as applied to claims 1-2, 4, 6-9, 21-22, 25-27, 29-34, 37-38, 40-41, 43-45, 47-51, 53 and 55 above, and further in view of Terrill. Andres does not teach the type of electrode (interdigitated) used or the measurement equipment used.

In the paper Terrill (***cited in the instant specification on page 26, lines 9-12***) discusses NMR, SAXS, Thermal, and Electron Hopping Studies of alkanethiol stabilized gold cluster monolayers in three dimensions. Au clusters stabilized by chemisorbed monolayers of octane-, dodecane-, or hexadecanethiolate were studied in solution and in the solid phase. These materials can be pumped free of solvent to form a dark brown solid that can be re-dissolved in nonpolar solvents. Their exceptional stability suggests that they may be viewed as cluster compounds. The self-assembled alkanethiolate monolayers stabilizing the metal clusters can be studied by using techniques that are insufficiently sensitive for study of a monolayer on a flat surface (e.g., ^{1}H and ^{13}C NMR, elemental analysis, DSC, thermogravimetry (TGA), diffusion-ordered NMR spectroscopy (DOSY)). Results from such measurements (combined with SAXS data on solutions of the clusters and AFM and STM images) are consistent with a small, monodisperse (12 Δ radius) Au core, which modeled as a sphere contains ~ 400 Au atoms and ~ 126 alkanethiolate chains, or if modeled as a cuboctahedral structure contains 309 Au atoms and ~ 95 alkanethiolate chains. High-resolution NMR spectra of cluster solutions display well-defined resonances except for methylenes nearest the Au interface; the absence of the latter resonance is attributed to a combination of broadening mechanisms based on the discontinuous change in magnetic susceptibility at the metal-hydrocarbon interface and residual dipolar interactions. Films of the dry, solid cluster compound on interdigitated array electrodes (see pages 12538-12539, experimental section for preparation and measurements) exhibit current-potential responses characteristic of electron hopping conductivity in which electrons tunnel from Au core to Au core. The electron hopping rate decreases and the activation barrier increases systematically at longer alkane chain length. The results are consistent with electron transport rate control being a combination of thermally activated electron transfer to create oppositely charged Au cores (cermet theory) and distance-dependent tunneling (β= 1.2Δ-1)

through the oriented alkanethiolate layers separating them. See pages 12545 - 12548 for a discussion of the electrical measurements.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the electrodes and measurement apparatus of Terrill into the formation method of Andres because of their known use and sensitivity for measuring resistivity of self-assembled colloid clusters as shown by Terrill.

9. Claims 2, 4, 6 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Andres in view of Bethell, Vossmeyer and Hostetler as applied to claims 1 and 22 above, and further in view of Natan (US 5,609,907). Andres does not teach other types of metal colloids or the use of amine functions in the coating materials.

In the patent Natan teaches the formation of self-assembled metal colloid layers. Figure 1A with its associated discussion teach that the colloids can be gold, silver or other suitable metals. Column 3, lines 39-59 and the brief description of Figures 1A and 1B teach the additional use of amine and other functional groups in addition to thiols used to immobilize the colloids on a surface. The brief discussion of the figures also includes colloids having two layers of metal. Figure 1D shows the various levels of self-assembled colloids including multilayered (bulk).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the metal cores and metal interacting functional groups of Natan into the self-assembled colloid structures of Andres because as shown by Natan the specifically claimed metals and functional groups would have been recognized as functional equivalents to those of Andres relative to the formation of the self assembled colloid layers and as allowing the properties of the materials to be changed as taught by Andres.

10. Claims 37-38, 40 and 50 are rejected under 35 U.S.C. 103(a) as being unpatentable over Andres in view of Bethell, Vossmeyer and Hostetler as applied to claim 1 above, and further in view of Okahata (*Supramolecular Science*, 1996, newly cited and applied) or Weisbecker (*Langmuir*, 1996). Andres does not teach the extent of ligand shell molecule heterofunctionalization claimed.

In the paper Okahata discusses gas-phase molecular recognition on functional monolayers immobilized on a highly sensitive quartz-crystal microbalance. Self-assembled

monolayers of alkanethiols having functional groups ($HS(CH_2)_{10}X$, X = H, COOH, $CONH_2$, NH_2, thymine and adenine bases) were immobilized on the Au electrode of a quartz-crystal microbalance (QCM), and the binding kinetics of guest molecules from the gas phase were studied by monitoring the time evolution of frequency decreases (mass increases) of the QCM. A highly sensitive, 63-MHz overtone frequency of a conventional 9-MHz at AT-cut QCM was developed to detect monolayer adsorption of small molecules. When HOAc was used as guest molecules, it adsorbed on the -CO NH_2 membrane as a Langmuir-type monolayer and adsorbed as multilayers on the -COOH and - NH_2 membranes, but scarcely adsorbed on the simple alkane membrane (-H membrane). When self-assembled monolayers bearing a thymine or adenine base as a terminal group are used, selective binding processes of complementary guest molecules are observed; 2-aminopyridine (an adenine model) and γ-butyrolactam (a thymine model) selectively bind to the thyamine and adenine monolayers, respectively.

In the paper Weisbecker discusses molecular self-assembly of aliphatic thiols on gold colloids. Self-assembled monolayers (SAMs) were formed on Au colloids in 50% aqueous EtOH in the presence of alkanethiols (HS(CH2)nR, where R represents a series of neutral and acidic functional groups). The different functional groups are shown in figure 1 and include alcohol, ester, ether and carboxylic acid functional groups. Specific compounds are 16-mercaptohexadecanoic acid, 11-mercaptoundecanoic acid, methyl 11-mercaptoundecanoate, 8-mercaptooctanoic acid, 12-mercaptododecanoic acid and 10-mercapto-1-decanol. Chemisorption of alkanethiols on the Au colloids significantly changes the rates of flocculation of the Au dispersions; the magnitudes of these pH-dependent changes are a function of chain length (n) and the terminal functionality (R) in a manner consistent with formation of SAMs on the colloid surface. The reduced rate of dissolution of alkanethiol-treated colloids by wet chemical etchants, TEM, and XPS data further support the formation of SAMs. The first paragraph of the right column of page 3763 and the paragraph bridging pages 3771-3772 teach that the date shown in the paper indicate that the properties of the alkane thiolate monolayers on gold colloids are similar to those monolayers formed on planar surfaces and depend on the alkane thiol precursor. The first full paragraph on page 3772 teaches that the functionalized nanoparticles are for potential applications in biosensors, catalysis and optoelectronics.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use ligand shell molecules having thiol functional groups as taught by Okahata or Weisbecker in the encapsulating shell of the Andres particles because of the their ability to functionalize or modify the electronic behavior of the assembly (material) for different applications such as a chemical sensor as taught by Andres, Okahata and Weisbecker.

11. The declaration filed on February 16, 2006 under 37 CFR 1.131 has been considered but is ineffective to overcome the Vossmeyer reference. First, the declaration does not identify the instant application as the application for which it was prepared. Second, the evidence submitted is insufficient to establish a reduction to practice of the invention in this country or a NAFTA or WTO member country prior to the effective date of the Vossmeyer reference. Applicant is required to show that they were in possession of the portion of the claimed invention taught by the reference. In this case it is the layer by layer formation of the three-dimensional structure that was taught by Vossmeyer. In reviewing the declaration, examiner was not able to find a disclosure of this in the documents provided. The first mention of this is in the provisional application that the parent application claim basis on. Thus the first evidence of the layer-by layer method of constructing the three-dimensional structure is the filing date of the provisional application, which is after the date of the Vossmeyer reference.

12. Claims 52 and 54 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims. The art of record fails to teach or suggest the claimed combination or elements.

13. Claims 28, 35-36 and 42 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten to include all of the limitations of the base claim and any intervening claims. The art of record fails to teach or suggest the claimed combination or elements. Relative to claims 35-36, it is noted that although the respective elements are conventional as evidenced by the page 21, line 17 to page 22, line 8, examiner was not able to determine if they are part of the measurement apparatus taught by Terrill.

14. Applicant's arguments filed July 18, 2006 have been fully considered but they are not persuasive. Relative to the claim interpretation, the interpretation has changed to one that allows coupling agents as defined in the specification to be in the ligand shell based on the use of

"composed" in the claim language. Relative to the lack of enablement for the structures of claims 52 and 54, examiner notes that product by process can be used to define a structure that is different based on the process compared to a similar structure formed by a different process. In this respect the three examples of producing three-dimensional particle arrays and what the instant specification says about them is critical to whether or not applicant has enabled a workable material. When the actual examples are considered, it is clear from the instant specification that of the three methods taught for forming a three-dimensional structure, only two of them produce a usable structure. And only one of those methods is capable of producing a usable material without coupling agents in the particles. There is also no record that would indicate that applicant has developed another method for producing the particle array without the particles containing coupling agents. Thus, the claims are not enabled for the full scope within the language of the claim. Using a product by process format for the device/article of manufacture claims would allow applicant to distinguish the structural differences attributable to the formation process relative to the use of the product for investigating a target environment to determine the presence or amount of a chemical species. Such a distinction may be difficult, if not impossible, with the instant claim format since it covers a structure made by the process that the instant specification clearly teaches as not suitable for the intended purpose. All other arguments are moot in view of the new grounds of rejection due to the change in the claim interpretation being used by examiner.

15. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The additionally cited art relates to formation of metal clusters or particles and formation of a monolayer of the surface of metals.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Arlen Soderquist whose telephone number is (571) 272-1265. The examiner can normally be reached on Monday-Thursday and Alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jill Warden can be reached on (571) 272-1267. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Arlen Soderquist

Arlen Soderquist
Primary Examiner
Art Unit 1743